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THE UNIVERSITY OF ALBERTA

PREDICTING SUCCESS OF EDUCATION STUDENTS IN ACADEMIC COURSES AND IN TEACHING

A DISSERTATION

SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

FACULTY OF EDUCATION

BY

JANET ISABEL MARTIN

EDMONTON, ALBERTA

OCTOBER 1950

Thesis
1950
#65

University of Alberta

Faculty of Education

The undersigned hereby certify that they have read and recommend to the School of Graduate Studies for acceptance, a thesis entitled "Predicting Success of Education Students in Academic Courses and in Teaching" submitted by Janet Isabel Martin, B.Com.,B.Ed., in partial fulfilment of the requirements for the degree of Master of Education.

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Date Oct. 12. 1950

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CHAPTER I

PURPOSE OF THE STUDY

Careful selection of entrants into the Faculty of Education would be of benefit to teachers themselves, to training institutions, and to the general public. Two reasons why a selection program is desirable are outlined below:

1. It has long been recognized that the acute teacher shortage has many causes. One of the most important factors is the rapid turn-over of teachers, many of whom each year leave teaching for some other occupation or profession. Many of those who leave the classroom are men and women who have not been happy or successful in their jobs. They are vocational misfits who should never have entered the teaching profession. Because of the shortage of teachers many inducements (lowered university entrance requirements, government tuition grants, aid by school divisions) have attracted to the Faculty of Education a number of young people, many of whom have neither the personal or academic qualifications or background or the necessary interest in teaching as a career to keep them in the teaching profession.

Higher pay and better teaching and living conditions alone are unlikely to solve the turnover problem.

Fully as important is a program of selection of applicants for entry to the Faculty of Education.

2. In the past, school teaching has often been thought of as a stepping-stone to another profession or as an occupation for those who can not succeed elsewhere. The training of such personnel wastes the time and money of both the trainees and the university. Even more important is the lowering of prestige of the teaching profession by uninterested and inefficient teachers who bring public criticism on the profession as a whole. The public will not recognize teaching as a profession until the large majority of teachers themselves respect teaching as a career. Those who are not both able and willing to accept the responsibility that successful teaching demands should be discouraged from entering teacher training institutions.

The best time to eliminate these undesirables would be before their entrance into the Faculty of Education. If a testing program could be developed which would, with some degree of accuracy, predict probable success in teaching, suitable applicants might be encouraged and aided to enter the profession and others recommended to a more suitable line of work.

The purpose of this study was to determine the value of selected tests in predicting success in subsequent university work, particularly in practice teach-

ing. Results obtained on the selected tests by students who were superior in practice teaching were compared with results of students showing themselves inferior in practice teaching to determine if any of the tests administered would distinguish between the two groups.

It was hoped that, on the basis of this study, recommendations could be given which would assist in the formation of a screening of selection program for applicants to the Faculty of Education.

CHAPTER II

A SURVEY OF SOME STUDIES OF TEACHER SELECTION AND PREDICTION OF TEACHING SUCCESS

The problem of selecting suitable candidates for teacher training has been before training institutions for many years. Research has been carried on by many teachers' colleges in an attempt to find some accurate means of predicting teaching success. This brief survey covers, in chronological order, some of the more important studies made in the last fifteen years.

Yaukey and Anderson(1) surveyed eighteen studies of intelligence and student teaching success and found the results contradictory. Correlation coefficients ranged from -.028 to .54. Fourteen studies of intelligence and success in the teaching field showed r's from .06 to .70. In general the higher r's were obtained with high school teachers and the lower correlations with teachers in the lower grades. Results of the studies varied so widely that no definite conclusions could be reached. The authors stated, however, that intelligence correlates as highly as any other measured trait.

Sandiford(2) based his work on 420 students registered in the College of Education of the University of Toronto during the 1934-35 term. Most of these were

graduate students and nearly all came from Ontario. He found that general information tests have little value in predicting teaching ability and that high academic standing does not necessarily mean good teaching. Personality tests were of no value. Personal interviews and observation of the first practice teaching assignment did not help faculty members to predict accurately which students would become good teachers. He concluded that it was easier to select better students than poorer ones. This suggested to him that it would be better to encourage promising students rather than to discourage those who looked less promising at the beginning of their training. His results showed, however, that practice teaching marks may have some value in predicting success or failure in the teaching field.

Ward and Kirk(3) administered the Bernreuter test to college freshmen. Four years later these students were rated on adaptability, interest, daily preparation and other teaching qualities. There was practically no relationship. Bernreuter scores on those who passed compared to those who failed showed no significant differences. The highest correlation obtained between Bernreuter scores taken in the freshman year and practice teaching in the fourth year was .15 on the dominance-submission trait. Similar studies were made by Ward and

Kirk with the Inventory of Activities and Interests by Link et al, The Bell Adjustment Inventory, and The Clark Thurstone Personality Schedule. No significant differences on these tests were found between good and poor student teachers.

Although significant correlations were not obtained more promise was shown by ratings of high school teachers and principals.

The authors concluded that personality as well as intelligence should be considered in selection of teachers but, of the two, ratings by high school teachers are more valid than scores on the personality tests administered.

An interesting little study by G. E. Retain(4) of 152 good teachers showed 30% of them had been emotionally unstable. He concludes, therefore, that it would not be advisable to bar candidates who were emotionally unstable, but rather to allow them to enter teacher training institutions and to assist them towards normal adjustment.

In two articles appearing in the Journal of Educational Research, M. V. Seagoe(5) reports on studies made of relationship between teaching success and high school and university scholarship. She found significant correlation between honor points at the end of the second year in Education and student teaching success and, in

general, approved of the use of high school marks and university scholarship in the prediction of teaching success in the selection of education candidates.

In an earlier study(6) Seagoe grouped students on the basis of marks in practice teaching and compared the groups using the Humm-Wadsworth Temperament Scale. At this time no significant difference was found. However, later,(7) significant results were found using the Humm-Wadsworth Temperament Scale (r = .63) and the Bell Adjustment Inventory (r = .40) while the results of the Bernreuter PI-C and the Thurstone Personality Schedule were almost significant.

Fuller(8) found no significant relationship between percentile ranks in high school academic averages and rank order in student teaching (r = .03), but a Pearsonian r of .62 between honor points for grades in university professional courses and rank order in student teaching.

Several other tests were given by Fuller. Correlations with student teaching marks are summarized below.

(a) American College Entrance -.06
(b) Miller Analogies Score .017
(c) American Council of Education Cooperative General Culture Test .13
(d) American Council of Education Cooperative English Test -.10

(e) Student-Teacher Rating Blank and ratings by instructors and supervisors .09. (This was obtained after individual interviews with the students about their weak and strong points.)

(f) Army Alpha Revised Form 5 and Bell Adjustment Inventory also failed to show significant correlation with teaching success.

Fuller stated that a certain minimum of intelligence, linguistic skill, general information, personal adjustment, and academic accomplishment are prerequisites for success in good teaching although r's obtained were only between -.17 and .14. He concluded that general college entrance requirements have already eliminated those below this minimum. The only significant factor found was college achievement. This, of course, is not available in time to be used in a selection program and Fuller concluded that further study should be carried out to develop some other criteria.

C. P. Archer of the University of Minnesota surveyed recent research in several fields of personnel work including teacher selection(9). He suggested that selection may well begin in secondary schools where students' possibilities may be estimated and the interest of desirable candidates could be stimulated. This program could be continued through junior and senior college and become more definite at entrance to student teaching where a more specific testing program could be used to reveal particular qualities necessary to good teaching.

Archer recognized the lack of objective data on what a successful teacher is and concluded that a composite of abilities is necessary. He pointed to the growing use of a number of measures in a prediction or selection program as evidence of the recognition of the multiple factor element in teaching success.

A typical selection program is outlined by Bobbitt(10). She reported on development of a program for use in Los Angeles City Schools. Of the 28 teachers selected by this method only 4% were found unsatisfactory. This program included tests of Intelligence, Achievement, Interest, Aptitude, Attitude, and Personality. High school marks, first year college marks, reading scores, instructors' rating and application forms were also used in the selection program.

Although much of the literature on this subject is inconclusive and many of the studies are contradictory some generalizations can be made.

Intelligence and personality both should be considered in any selection program. One writer suggests that candidates should be in the upper quintile in intelligence(7). However, general college entrance requirements should be sufficient to screen students here.

Selection of students with desirable personality traits is more difficult. No general formula can be given.

Good teachers may be the quiet, reserved "counselor" type or lively and stimulating. This suggests why personality tests which try to classify personality types have been found of little value in predicting teaching success.

The value of the personal interview was studied by Dr. Jack Shaw of the University of Minnesota recently, using a group of 70 education students majoring in social studies.(11) He assumed "that fitness for teacher training is a composite of four factors - health, intellectual capacity, professional interests, and personal-social qualities - and that these factors are measurable by health officers' ratings, honor point ratios, Strong's social science teachers' scale of interests, and the Teachers' Attitudes Inventory." In this connection he made comparisons of two sets of correlation coefficients. The first set consisted of correlations between the ratings of practice teaching success and judges' ratings of fitness for training based on objective data. The second set of correlations was between the same ratings of practice teaching success and on interviewers rating based on the same objective data plus the interview information and observations. Correlations with the interviewer's rating made in the first year of teacher training and in the last quarter were as follows:

	First year	Last Quarter
Composite rating of fitness for training	0.42	.42
Rating on Factor of Intellectual Capacity	.32	.36
Rating on Factor of Professional Interest	.42	.35
Rating on Factor of Personal-Social Qualities	.40	.41

He concludes, "One outcome of the study is the justification of the use of the interview in addition to objective data, particularly as it provides indications of personal-social qualities which are appraised only in the interview."

CHAPTER III

EXPERIMENTAL DESIGN

1. Testing Program

The tests selected for this study were:

1. Nelson-Denny Reading Test for Colleges and Senior High Schools. Vocabulary and Paragraph. Form A.
2. Wellesley Spelling Test.
3. Abstract Reasoning Test or Verbal Reasoning Test of the Differential Aptitude Tests, Psychological Corporation.
4. Johnson Temperament Analysis.
5. Vocational Guidance Centre Intelligence Indicator, Form B, Grades 7-12. This test was added at the request of a number of students who wished to take an intelligence test.

2. Source of Data

These tests were administered during the 1948-49 winter session to all first year students registered in the Faculty of Education, University of Alberta. This included 222 students registered in the one year Junior Elementary and Intermediate Program and 89 first year students in the four year Bachelor of Education Program. The total number of students tested was, therefore, 311.

3. Selection of Groups

The purpose of this study was to select tests which could be used in a teacher selection program to pick out students who seemed to possess the qualities necessary for successful classroom teaching. Practice teaching during training is intended to reproduce the actual classroom situation as closely as possible. This gives the student a chance to meet practical problems with the guidance of an experienced teacher and gives the instructor or demonstrator teacher some insight into the student's future success in the classroom. Therefore, the final mark obtained in Education 159, Practice Teaching, was taken, for this study, as the criterion of successful teaching. That is, the assumption was made that the students making the highest marks in practice teaching will probably become the most successful teachers.

The final mark in Education 159 is an average of marks obtained from three rounds of teaching. Each student spent a week in a city classroom and two weeks in a rural school before Christmas. After Christmas the student returned to the same rural school for two more weeks. In some cases where students received very unsatisfactory reports a fourth teaching assignment was made at the Practice School where faculty members could watch. The reports of the demonstrator teachers were converted

into marks using the following scale:

A - 80 and over
B - 65 - 79
C - 50 - 64
D - 40 - 49
E - under 40

The three marks were then combined with later grades weighted more heavily than early scores.

Education 159, Practice Teaching, is not included in the first year program in the degree course. Consequently, practice teaching scores were available only for students in the one year Junior Elementary and Intermediate Program. Seven of the original class had dropped out by April leaving the final registration in Education 159 at 215 students. The marks obtained in Education 159 by these students are shown in the following table:

TABLE I

DISTRIBUTION OF MARKS IN EDUCATION 159
PRACTICE TEACHING

Mark	Number of Students
85	2
80	20
75	33
70	41
65	36
60	33
55	31
50	5
45	5
40	8
35	1
Total	215

The top 20% and the bottom 20%, according to their marks in practice teaching, were then selected. This made two contrasting groups of 43 students each. The top 20% included those students receiving 85 and 80 (that is 2 + 20 = 22) and 21 of the 33 students receiving 75 as a mark. These 21 were selected by using Lindquist's random numbers. The bottom 20% were selected in the same way. The 19 students making marks of 35, 40, 45 and 50 were chosen and 24 of the 31 in the critical category (mark 55) were selected randomly.

4. Method of Comparison

These two groups were then compared for difference in sex, Grade XII average, University first year average, and scores obtained on the five tests mentioned at the beginning of this chapter. The methods used in this comparison were:

1. Testing the significance of the mean difference. The formula used for calculating the standard error of the difference between the means was

$$\sigma_D = \sqrt{\sigma^2_{M_1} + \sigma^2_{M_2}} \quad (12)$$

where $$\sigma_M = \frac{\sigma}{\sqrt{N-1}} \quad (13)$$

A critical ratio was then obtained by dividing the difference between the means of the two groups by its standard error.

With the exception of the Differential Aptitude Tests the 43 students in each group wrote each test. The degrees of freedom were actually 42 + 42 or 84. However, the t's or CR's for 80 degrees of freedom in Garrett's Table 29 (14) were taken without interpolation as these furnish a close approximation. This table takes into consideration both tails of the curve. As we are interested in finding the probability that one group is superior to the other group P/2 is used to find the level of significance.

When the degrees of freedom equal 80 the entry in Garrett's table 29 at the .01 level (P/2 = .05) is 1.66 and at the .02 level (P/2 = .01) is 2.38. In this study a t of 1.66 or higher (P/2 = .05) was considered significant. That is, if the obtained difference was so large that it could occur only 5 times or less in 100 trials due to sampling errors then the conclusion that one group was significantly superior to the other was accepted.

2. Chi-square test. Two Chi-square tests were used.

(a) To test the frequency obtained in each of the two groups with the frequency obtained by the whole group. It was assumed that the distribution of marks on any test would be similar in either group of 43 students to the distribution in the whole group of 215 students. That is, if 10% of the students in the whole group of 215 re-

ceived a mark over 80 on a certain test one could expect 10% of the students in a group of 43 (taken from the 215) to make a score of over 80. The null hypothesis - that is, that there was no difference between the groups - was tested. If the divergence between the distribution of marks actually obtained by one of the groups and the marks obtained by the whole group was so large that it could be expected to occur less than 5 times in 100 trials due to errors in sampling then the null hypothesis was rejected and it was accepted that the group being tested was actually different from the whole group.

(b) Chi-square test of independence. In this test the Top and Bottom Groups were compared by using a contingency table and calculating independence values for each cell. These values are the frequencies which would normally be expected in each cell of the table if there was no relation between the groups. The value of χ^2 depends on the differences between the frequencies obtained by each group and the independence values. The wider the divergence the higher and more significant the χ^2. If a χ^2 was so large that its chances of occurrence due to errors in sampling were 20 to 1 then it was concluded that the difference between the two groups was significant.

Table 32, on page 242 in Garrett's "Statistics in Psychology and Education" was used.

CHAPTER IV

ANALYSIS OF DATA
THE DIFFERENCES BETWEEN THE GROUPS

The following points should be kept in mind when reading this Chapter:

1. The contrasting groups used in this study were selected, as outlined in the previous chapter, on the basis of final marks in Education 159, Practice Teaching. The first group of 43 students was the top 20% of the class in practice teaching and are referred to in this study as the Top Group. Similarly, for the sake of brevity, the 43 students receiving the lowest marks in practice teaching are referred to as the Bottom Group.

2. In all cases a Probability of .05 or less was required before the difference was considered significant.

3. The differences between the two groups are analyzed in this Chapter under the following headings:

1 - Sex

2 - Grade XII Average

3 - University First Year Average

4 - Nelson-Denny Reading Test
(a) Vocabulary
(b) Paragraph (Reading)

5 - Wellesly Spelling Test

6 - Differential Aptitude Tests

7 - Johnson Temperament Analysis

8 - Vocational Guidance Centre Intelligence Indicator

1. Sex

In the whole group of 215 students there were 151 girls and 64 boys. That is, 70.23% of the class were girls and 29.77% were boys. In a group of 43 students, therefore, one would expect 30 girls and 13 boys if the percentage distribution of sex remained the same as in the whole group. Actually, the Top Group contained 37 girls and 6 boys and the Bottom Group was made up of 25 girls and 18 boys. Percentage distribution by sex is shown in the following table.

TABLE II

DISTRIBUTION OF GROUPS BY SEX

	No. of Girls	%	No. of Boys	%
Whole group (N = 215)	151	70.23	64	29.77
Top 20% (N = 43)	37	86.05	6	13.95
Bottom Group (N = 43)	25	58.14	18	41.86

The Top Group contained more girls than would be expected and the Bottom Group contained more boys. The expected distribution by sexes was compared with the

actual distribution using the Chi-square test. The hypothesis tested here was that, if 43 students are selected from a group of 215, the percentage distribution by sex will be the same in the group of 43 as it was in the whole group. The f_o in the table is the percentage of boys and girls in the top group and the f_e or expected frequency is the percentage of boys and girls in the whole group.

Comparing the distributions by sex in the Top Group with the distribution by sex in the whole group gave a χ^2 of 5.14 with a P of .025.

This means, that if we were to repeat this experiment, less than 3 times in 100 trials would a χ^2 of 5 or more be expected to occur if our hypothesis were true. The divergence of observed distribution by sex in the top group with the distribution by sex in the whole group is too large to attribute to fluctuations in sampling. We can conclude, that the divergence is significant and that there are more girls and less boys in the Top Group than would be expected.

Testing the bottom group on distribution by sex with the distribution by sex in the whole group gives a χ^2 of 3.02. A divergence of this size could be expected to occur less than 9 times in 100 due to errors in sampling and, therefore, is not accepted as quite large

enough to disprove our hypothesis.

We can conclude, however, that in this group there was a significantly larger percentage of girls obtaining the top marks in practice teaching.

2. Grade XII Average

Marks obtained on Grade XII Departmental Examinations only were considered in obtaining the averages used.

As entrance to the Faculty of Education requires only the High School Diploma (100 credits) with B standing in Social Studies 3 and English 3 it is possible for students to enrol with only these two marks. The number of subjects written by students varied from two to eight. The average number of Grade XII Departmental subjects taken by the students in the Top Group was 6.02 and in the Bottom Group 5.60.

Results of the study show that students in the Top Group have significantly better Grade XII records on Departmental subjects than students in the Bottom Group. As might be expected, the mean of the average marks obtained by all students in the whole group lies between the means of the Top and Bottom Groups.

TABLE III

FREQUENCY DISTRIBUTION OF MARKS OBTAINED ON GRADE XII DEPARTMENTAL EXAMINATIONS BY STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND IN THE WHOLE GROUP

	Top Group	Whole Group	Bottom Group
82 - 84	1	3	0
79 - 81	2	3	0
76 - 78	2	7	1
73 - 75	2	4	0
70 - 72	0	8	2
67 - 69	7	17	2
64 - 66	8	26	2
61 - 63	7	38	9
58 - 60	5	38	11
55 - 57	6	31	10
52 - 54	2	24	5
49 - 51	0	9	1
46 - 48	1	3	0
43 - 45	0	2	1
40 - 42	0	1	0
N	43	214	43
M	64.31	61.05	59.02
σ	7.83	7.55	5.62

The difference between the mean obtained by the Top Group and the mean obtained by the Bottom Group was 5.289 marks. This CR of this difference is 3.61. To be significant at the .01 level in this case would require a CR of 2.38. Therefore, the critical ratio of 3.61 obtained here shows that the mean difference of 5.289 is very significant and would occur less than once in 100 trials due to sampling errors. We can state with a high degree of confidence that the students in the Top Group obtained significantly higher marks on their Grade XII

Departmental Examinations than students in the Bottom Group.

3. University Average

Students in the Junior Elementary and Intermediate Course all take the same program and the average used was the one appearing in the First Year Report. This average includes all subjects taken, including Practice Teaching.

University averages obtained by members of the Top Group ranged from 56 to 82.6 and the mean was 68.73. The range in the Bottom Group was 38.5 to 69.2 with the mean at 57.45. The mean difference was then more than eleven marks.

The mean difference between the Top and Bottom Groups is 11.28 marks and its SE is 1.48. The critical ratio is, therefore, 7.64. A CR of 2.38 indicates a difference significant at the .01 level. We can state with a very high degree of confidence that the Top Group is also significantly better than the Bottom Group in other University marks. In fact, the difference between the groups on University average is so great that it could occur less than 1% of the time due to errors in sampling.

The deviation between the groups on the basis of University average is also shown by the Chi-Square test.

TABLE IV

FREQUENCY DISTRIBUTION OF UNIVERSITY AVERAGES BY STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND IN THE WHOLE GROUP

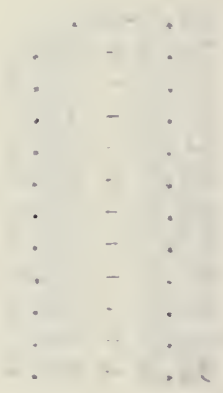
	Top Group	Whole Group	Bottom Group
80.5-84.4	3	3	0
76.5 - 80.4	3	3	0
72.5 - 76.4	7	14	0
68.5 - 72.4	6	26	2
64.5 - 68.4	12	48	5
60.5 - 64.4	8	38	6
56.5 - 60.4	3	39	10
52.5 - 56.4	1	24	9
48.5 - 52.4	0	14	8
44.5 - 48.4	0	3	1
40.5 - 44.4	0	0	0
36.5 - 40.4	0	1	1
N =	43	213	42
M =	68.73	62.91	57.45
σ =	6.80	7.35	6.65

TABLE V

COMPARISON OF THE TWO GROUPS ON UNIVERSITY AVERAGE

	36.5-48.4	48.5-60.4	60.5-72.4	72.5-84.4	Totals
Top Group	(1) 0	(15.7) 4	(19.7) 26	(6.6) 13	43
Bottom Group	(1) 2	(15.3) 27	(19.3) 13	(6.4) 0	42

From independence values calculated for each cell a χ^2 of 56.54 is obtained. A χ^2 of this size could occur less than once in 100 trials due to errors in sam-



pling. We can state with a high degree of confidence that distribution of University averages obtained by the Top Group differs significantly from the marks obtained by the students in the Bottom Group. A comparison of the independence values in each cell with the obtained frequencies shows that the Top Group made higher marks and the Bottom Group made lower marks than would be expected.

The difference between the two groups in University was also shown by the following facts:

1. Only nine students of the Top Group failed any university courses. Of these nine, two students failed two courses and the remaining seven failed in one course each. This made the average number of failures in this group .236. However, 26 members of the Bottom Group failed from one to ten University courses. The average number of courses failed per student in this group was 2.21.

2. Five students in the Bottom Group were placed in Category 2 (recommended withdrawal) and three were placed in Category 4 (requested withdrawal). None of the Top Group was so classified.

RELATIONSHIPS BETWEEN PRACTICE TEACHING, UNIVERSITY AVERAGE AND GRADE XII DEPARTMENTAL AVERAGE

Coefficients of correlation obtained from data

on the whole group of 215 students were as follows:

(1) University Average and Grade XII Average - r = .50

(2) University Average and Practice Teaching - r = .52

(3) Grade XII Average and Practice Teaching - r = .18

As the r of .18 between Grade XII Average and Practice Teaching seemed out of line with the other correlation coefficients a closer study of this relationship was made. The whole group of 215 students was broken down into three groups - the Top Group (that is, the 20% in Practice Teaching), the Middle Group (that is the 129 students with practice teaching marks from 55 to 75), and the Bottom Group - and the correlation coefficient between Grade XII average and practice teaching was calculated for each group. They were as follows:

(1) Top Group r = -.29

(2) Middle Group r = .55

(3) Bottom Group r = .01

The coefficient obtained for the middle or average students in practice teaching was what one would expect as it is in line with the obtained correlations between University average and Grade XII average and between University Average and Practice Teaching. The correlations

obtained using the Top and Bottom Groups, however, does not indicate a significant relationship between practice teaching scores and Grade XII averages.

The reader may well be surprised at the lack of relationship between Grade XII average and practice teaching, while the relationship between university average and practice teaching was fairly marked. It will be noted that a similar finding was reported in my review of related studies. It may be that university evaluation is based to a greater degree on laboratory and term work, in which the personal qualities of the student intrude, than is the case in an impersonal province or state-wide final examination. Similarly it would seem possible that the Top and Bottom Groups exhibit greater personality deviation from the normal than is true of the Middle Group; this might account for the second finding referred to above. It should be remembered however, that, although there is no significant correlation between Grade XII averages and practice teaching, the top students in practice teaching had significantly higher Grade XII averages than students in the bottom group.

4. Nelson-Denny Reading Test

The report in Buros states this test has a correlation coefficient of validity of .70 with an objective

psychological test and a reliability coefficient of .91. (15)

This test has two sections, Vocabulary and Paragraph, which are scored separately.

(a) VOCABULARY - this section of the test contains 100 words the meanings of which are to be indicated by selecting the best answer from five choices. Only ten minutes are allowed so speed is definitely a factor. The total possible score is 100.

TABLE VI

FREQUENCY DISTRIBUTIONS OF SCORES MADE ON NELSON-DENNY VOCABULARY TEST BY STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND IN THE WHOLE GROUP

	Top Group	Whole Group	Bottom Group
76 - 80	0	1	0
71 - 75	0	1	0
66 - 70	2	4	2
61 - 65	4	6	0
56 - 60	0	1	0
51 - 55	5	16	2
46 - 50	7	22	4
41 - 45	6	29	4
36 - 40	4	31	10
31 - 35	7	40	7
26 - 30	6	34	6
21 - 25	2	19	5
16 - 20	0	8	3
11 - 15	0	2	0
N =	43	214	43
M =	42.88	27.97	36.14
σ =	12.55	11.88	11.52

In the Top Group scores ranged from 24 to 70 and the mean was 82.88. Marks in the Bottom Group were taken from 17 to 69 with the mean 36.14. The mean of the whole group was 37.97. The difference between the means of the Top and Bottom Groups was, therefore, 6.74. It is interesting to note that, in this vocabulary test, the Top Group was significantly better than the group as a whole (Mean difference 4.91, $t = 2.39$, $P = .01$). However, the Bottom Group did not differ significantly from the whole group. (Mean difference 1.83). This suggests that this test might be useful in predicting the best student teachers but would have little value in predicting poor student teachers.

The mean difference of 6.74 between the Top and Bottom Groups indicates a real difference. From this difference and its standard error of 2.59 a critical ratio of 2.60 is obtained. Such a large difference would occur less than once in one hundred times due to errors in sampling. We can conclude that the Top Group was significantly better in vocabulary as measured by this test.

(b) PARAGRAPH - this section combines reading speed and reading comprehension. A reading speed of 300 words per minute is required to complete the test. It contains four multiple choice questions on each of

nine reading selections. Two marks are given for each correct answer so the total score possible is 72.

TABLE VII

FREQUENCY DISTRIBUTIONS OF SCORES MADE ON NELSON-DENNY READING TEST BY STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND IN THE WHOLE GROUP

	Top Group	Whole Group	Bottom Group
62 - 66	2	5	0
57 - 61	4	14	3
52 - 56	7	27	4
47 - 51	3	29	7
42 - 46	8	36	8
37 - 41	6	25	6
32 - 36	8	45	7
27 - 31	2	20	6
22 - 26	3	11	2
17 - 21	0	1	0
12 - 16	0	2	0
N =	43	215	43
M =	43.65	41.90	41.44
σ =	10.86	10.57	9.61

This table shows how similar the distributions of marks were. The mean difference between the Top and Bottom Groups was only 2.21. A difference of this size could occur 37 times out of 100 trials due to sampling errors. The Top Group is, therefore, not significantly better than the Bottom Group in reading speed and comprehension as measured by this test.

5. Wellesley Spelling Test

This test is of the multiple choice type and contains 50 words which were selected from common spelling errors taken from freshman themes at Wellesley.

The difference between groups here was found to be very significant. In this connection it might be well to refer to The Third Mental Measurement Yearbook edited by Buros. It is stated here that the norms are based on only 152 college freshmen all attending Wellesley so the stated reliability and validity (.75) of this test is not necessarily very sound.(15)

TABLE VIII

FREQUENCY DISTRIBUTIONS OF SCORES MADE ON WELLESLEY SPELLING TEST BY STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND IN THE WHOLE GROUP

	Top Group	Whole Group	Bottom Group
44 - 47	8	17	1
40 - 43	12	45	10
36 - 39	13	55	10
32 - 35	6	57	10
28 - 31	3	23	7
24 - 27	0	12	4
20 - 23	1	5	0
16 - 19	0	1	1
N =	43	215	43
M =	38.62	35.92	32.20
σ =	5.27	5.73	5.90

As shown in the above table the mean difference between the Top and Bottom Groups was large - 6.418 points. A critical ratio of 5.26 was obtained. A difference of 6.418 could be obtained less than once in 100 trials due to sampling errors. In fact, for the Top Group to be considered significantly better than the Bottom Group at the .01 level the critical ratio need be only 2.38.

The Chi-square test of independence shows that the deviation between the two groups on this test is almost significant at the .05 level. A χ^2 of 7.815 is required at the .05 level and the χ^2 obtained was 7.48.

TABLE IX

COMPARISON OF THE TWO GROUPS ON WELLESLEY SPELLING TEST

	16 - 23	24 - 31	32 - 39	40 - 47	Total
Top Group	(1) 1	(7) 3	(19.5) 19	(15.5) 20	43
Bottom Group	(1) 1	(7) 11	(19.5) 20	(15.5) 11	43

The obtained distributions of marks in the Top and Bottom groups were compared with the distribution expected assuming that the percentage distribution of

marks in each group of 43 students would be the same as in the whole group of 215 students. Comparing the distribution obtained by the Top Group and the distribution obtained by the Whole Group gives a χ^2 of 15.66 which is very significant at the .01 level. The distribution of marks made by the Top Group deviated from the distribution of marks made by the Whole Group.

A χ^2 of this size could be expected to occur more than 50% of the time due to errors in sampling. This χ^2 is clearly not significant and we must retain our hypothesis. Students in the Bottom Group did not differ significantly from the group as a whole.

These results again suggest that it is easier to select the better students than the poorer ones.

6. Differential Aptitude Tests

Each student took either the Verbal Reasoning Test or the Abstract Reasoning Test of this battery. For this reason the sizes of the groups differ and are, of course, much smaller. Statistics obtained, therefore, may be less accurate.

(a) ABSTRACT REASONING

This test was administered to 26 students of the Top Group and 14 students of the Bottom Group. Using 40 degrees of freedom levels of significance are t = 2.42 at the .01 level and t = 1.68 at the .05 level.

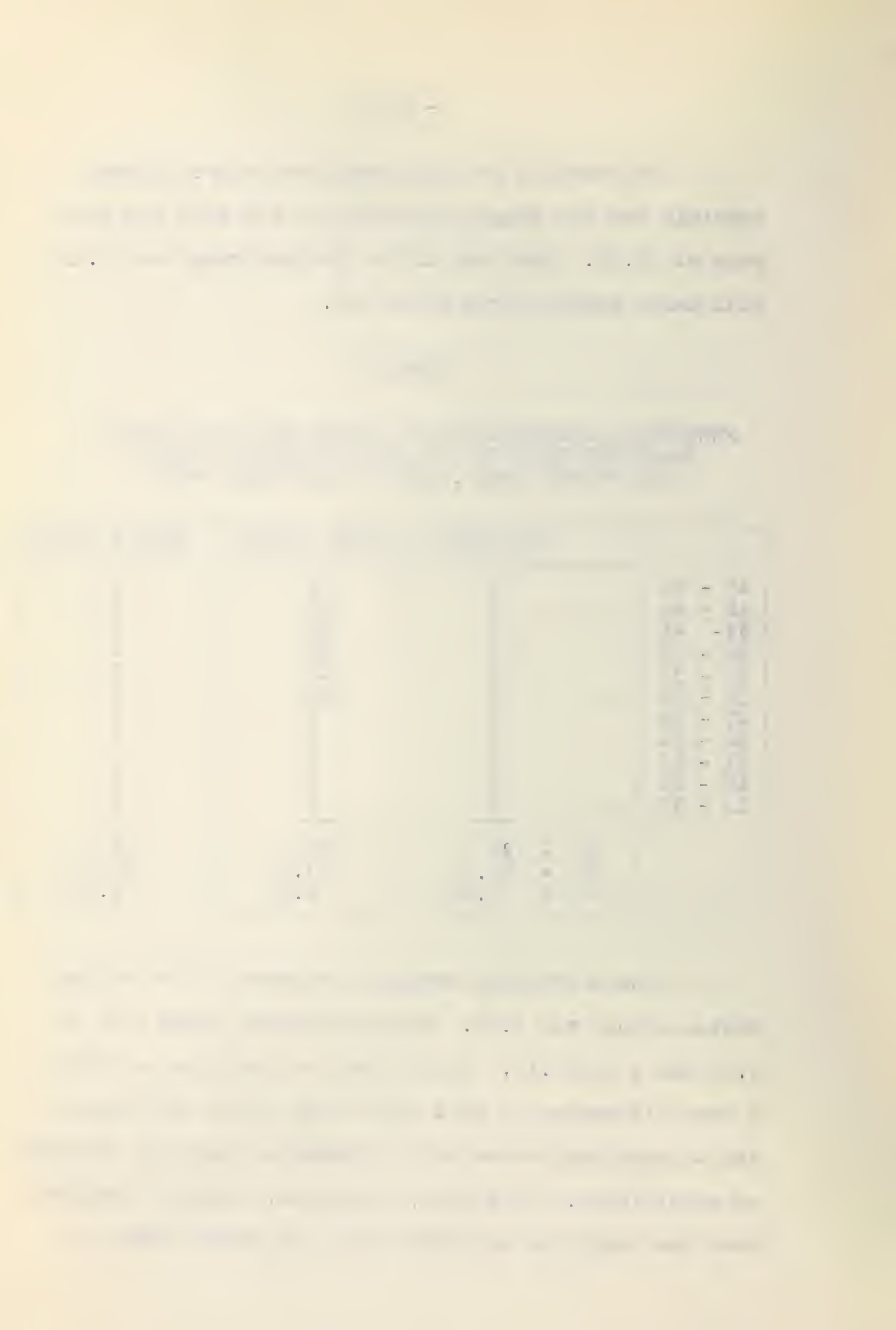
Students in the Top Group made scores (total possible was 50) ranging from 27½ to 47½ with the average at 38.23. The Mean in the Bottom Group was 36.21 with marks ranging from 18 to 43¾.

TABLE X

FREQUENCY DISTRIBUTIONS OF SCORES MADE ON ABSTRACT REASONING TEST BY STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND IN THE WHOLE GROUP

	Top Group	Whole Group	Bottom Group
45 - 48	3	7	0
42 - 44	7	22	4
39- 41	3	16	3
36 - 38	6	17	2
33 - 35	4	18	0
30 - 32	2	10	2
27 - 29	1	7	1
24 - 26	0	2	1
21 - 23	0	1	0
18 - 20	0	2	1
15 - 17	0	1	0
N =	26	103	14
M =	39.23	37.21	36.21
σ =	5.04	6.36	7.70

The difference between the means of the Top and Bottom Groups was 3.02. This difference gives a CR of 1.28 and a P of .13. As it would be possible to obtain a mean difference of this size in 13 out of 100 trials due to sampling errors this difference cannot be accepted as significant. This test, therefore, does not indicate that the Top Group is better than the Bottom Group in



Abstract Reasoning.

The number of students to whom the test was administered was too small to get an accurate picture, however.

(b) VERBAL REASONING

17 members of the Top Group and 29 members of the Bottom Group took this test and marks were as follows out of a possible score of 50:

TABLE XI

FREQUENCY DISTRIBUTIONS OF SCORES MADE ON VERBAL REASONING TEST BY STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND IN THE WHOLE GROUP

	Top Group	Whole Group	Bottom Group
48 - 50	0	2	0
45 - 47	1	4	2
42 - 44	1	10	2
39 - 41	6	17	2
36 - 38	0	13	2
33 - 35	2	16	3
30 - 32	6	25	7
27 - 29	1	12	4
24 - 26	0	5	2
21 - 23	0	3	2
18 - 20	0	3	1
15 - 17	0	2	2
	N = 17	112	29
	M = 35.94	34	31.31
	σ = 5.41	6.93	7.95

Marks in the Top Group ranged from 27 to 47 and in the Bottom Group from 17 to 45. Means were 35.94 and 31.31. The mean difference was 4.63, its critical ratio

2.29. With 45 degrees of freedom, levels of significance are t = 1.68 at the .05 level and t = 2.49 at the .01 level. These levels are using P/2 and test, therefore, not the difference between groups but the superiority of the Top Group over the Bottom Group. The difference of 4.63 indicates a significant difference between groups and we can conclude that the Top Group is better than the Bottom Group on the Verbal Reasoning part of this test.

These results suggest that the test of Verbal Reasoning is better than the test of Abstract Reasoning for our purpose. However, the small size of the samples makes a definite conclusion impossible.

7. Johnson Temperament Analysis

This test of 182 questions purports to measure nine personality traits. Brief descriptions of the traits and the differences found between groups are listed below. Frequency distributions are on the following pages. Raw scores were used in the calculation and there are approximately 20 questions referring to each trait. A positive difference shows that the Top Group had a higher mean than the Bottom Group and a negative difference indicates that the mean of the Bottom Group was higher. The Composite Score was obtained by adding values assigned to the raw scores of individual traits as suggested in the

Manual accompanying the test.

TABLE XII

COMPARISON OF GROUPS ON JOHNSON TEMPERAMENT ANALYSIS			
Name of Trait	Mean Score Top Group	Mean Score Bottom Group	Mean Difference
A Nervous - Composed	6.093	5.703	.390
B Depressive - Gay-hearted	4.023	3.946	.077
C Active - Quiet	10.349	10.405	-.056
D Cordial - Cold	14.326	14.432	.106
E Sympathetic - "Hard-Boiled"	13.837	13.784	.053
F Subjective - Objective	12.791	13.243	-.452
G Aggressive - Submissive	8.442	7.757	.685
H Critical - Appreciative	5.070	4.946	.124
I Self-Mastery - Impulsive	14.186	13.243	.943
Composite Score	67.05	67.68	-.63

The largest difference obtained was on Trait I - Self-Mastery. This difference of .943 has a critical ratio of .99 which gives it a probability of .37 which is definitely not significant. Differences of this

order are much too small to indicate a significant difference between the two groups. The Top Group was not superior to the Bottom Group on any of these personality traits as measured by this test.

Referring again to The Third Mental Measurement Yearbook(15) one finds little to recommend this test. It states that it does not represent a distinct theory of personality analysis but does resemble more normal types of behavior patterns. The statistical reliability for 300 cases for the various traits is given in the manual as ranging from .57 to .77. Buros says "There is very little published about the test, its reliability, validity or usefulness." He states that not much can be said about its possibilities and limitations until construction, description and standardizing are improved. The Yearbook concludes with "It is not too promising." Perhaps the low differences obtained indicate low validity of the test rather than similarity of the personalities of the students in the two groups.

TABLE XIII

FREQUENCY DISTRIBUTIONS OBTAINED BY STUDENTS IN THE TOP AND BOTTOM GROUPS ON JOHNSON TEMPERAMENT ANALYSIS

Trait A Nervous - Composed		
Raw Score	Top Group	Bottom Group
15	0	1
14	0	0
13	3	0
12	2	1
11	0	0
10	1	3
9	1	1
8	7	1
7	4	5
6	5	5
5	5	6
5	5	5
3	3	4
2	5	5
1	2	0
N	43	37
M	6.093	5.703
Mean Difference .390		

Trait B Depressive - Gay-hearted		
Raw Score	Top Group	Bottom Group
12	1	0
11	1	0
10	1	0
9	1	1
8	0	1
7	2	4
6	4	3
5	5	5
4	4	6
3	8	9
2	13	2
1	2	3
0	1	3
N	43	37
M	4.0233	3.9456
Mean Difference .1777		

Trait C Active - Quiet		
Raw Score	Top Group	Bottom Group
17	0	1
16	1	0
15	3	2
14	0	3
13	10	4
12	4	6
11	6	3
10	2	6
9	4	3
8	5	0
7	4	4
6	1	2
5	1	1
4	0	1
3	1	1
2	1	0
N	43	37
M	10.3488	10.4054
Mean Difference -.0566		

Trait D Cordial - Cold		
Raw Score	Top Group	Bottom Group
20	0	1
19	3	2
18	4	2
17	7	5
16	4	5
15	6	7
14	2	4
13	5	2
12	3	4
11	2	0
10	3	2
9	3	1
8	0	0
7	0	0
6	1	1
5	0	1
N	43	37
M	14.3256	14.4324
Mean Difference -.1068		

Trait E Sympathetic - "Hard-Boiled"		
Raw Score	Top Group	Bottom Group
18	4	0
17	0	5
16	7	7
15	9	4
14	6	6
13	5	3
12	5	6
11	3	2
10	1	3
9	0	0
8	3	0
7	0	0
6	0	1
N	43	37
M	13.8372	13.7838
Mean Difference .0534		

Trait F Subjective - Objective		
Raw Score	Top Group	Bottom Group
19	2	2
18	5	1
17	2	1
16	2	4
15	3	6
14	5	4
13	4	6
12	1	1
11	6	6
10	4	1
9	3	3
8	1	1
7	0	0
6	2	1
5	2	0
4	1	0
N	43	37
M	12.7907	13.2432
Mean Difference -.4525		

Trait G Aggressive - Submissive		
Raw Score	Top Group	Bottom Group
15	1	0
14	1	0
13	1	1
12	3	1
11	3	2
10	6	5
9	6	10
8	5	2
7	9	6
6	1	1
5	3	3
4	2	4
3	2	1
2	0	1
N	43	37
M	8.4419	7.7568
Mean Difference .6851		

Trait H Critical - Appreciative

Raw Score	Top Group	Bottom Group
15	1	0
14	0	0
13	1	0
12	0	0
11	1	0
10	0	0
9	3	2
8	2	3
7	4	6
6	5	7
5	4	5
4	7	3
3	5	4
2	4	4
1	4	2
0	2	1
N	43	37
M	5.0694	4.946
Mean Difference .024		

Trait I Self-Mastery - Impulsive		
Raw Score	Top Group	Bottom Group
19	2	2
18	5	1
17	2	1
16	2	4
15	3	6
14	5	4
13	4	6
12	1	1
11	6	6
10	4	1
9	3	3
8	1	1
7	0	0
6	2	1
5	2	0
4	1	0
N	43	37
M	14.1860	13.2432
σ	5.29	2.96
Mean Difference .943 t = .99 Not significant		

Composite Score		
	Top Group	Bottom Group
86 - 90	2	1
81 - 85	5	4
76 - 80	5	3
71 - 75	6	8
66 - 70	7	7
61 - 65	9	5
56 - 60	2	5
51 - 55	2	2
46 - 50	2	1
41 - 45	1	0
36 - 40	1	0
31 - 35	0	0
26 - 30	0	0
21 - 25	0	1
16 - 20	1	0
N	43	37
M	67.05	67.68
Mean Difference -.63		

8. Vocational Guidance Centre Intelligence Indicator

This test is a Canadian edition of the Henman-Nelson Test of Mental Ability. It contains a variety of items (90 in all) including vocabulary, arithmetical series and problems, sentence order. Mursell(16) reports that the Henman Nelson test has a quoted reliability of between .80 and .90. The validity of the test is indicated by a .75 to .90 correlation with other similar tests and a correlation coefficient from .45 to .65 with course marks and grade averages in college. The form used was designed for use in

TABLE XIV

FREQUENCY DISTRIBUTIONS OF IQ'S OF STUDENTS IN THE TOP GROUP, THE BOTTOM GROUP, AND THE WHOLE GROUP

	Top Group	Whole Group	Bottom Group
134 - 136	0	4	1
130 - 133	9	15	1
126 - 129	4	23	5
122 - 125	7	42	7
118 - 121	14	58	9
114 - 117	5	31	7
110 - 113	4	27	8
106 - 109	0	9	2
102 - 105	0	4	2
98 - 101	0	2	1
N	43	215	43
M	122.20	119.70	117.83
σ	6.26	7.04	7.68

Grades 7 to 12. Calculations were based on IQ's obtained from raw scores.

The difference between the means of the Top and Bottom Groups was 4.37, its critical ratio 2.86, and the probability of a difference of this size occurring due to errors in sampling is .01. As a mean difference of this size could occur less than once in 100 trials due to errors in sampling we can state with a high degree of confidence that the students in the Top Group, on the average, had higher IQ's than those in the Bottom Group.

The Chi-square test of independence also shows a divergence between the distribution of IQ's in the two groups. The contingency table follows:

TABLE XV

COMPARISON OF THE TWO GROUPS ON INTELLIGENCE QUOTIENT

	98 - 105	106 - 113	114 - 121
Top Group	0 (1.5)	4 (7)	19 (17.5)
Bottom Group	3 (15.)	10 (7)	16 (17.5)
	122 - 129	**130 - 136**	**Total**
Top Group	11 (11.5)	9 (5.5)	43
Bottom Group	12 (115.)	2 (5.5)	43

Independence values are shown in brackets. A χ of 10.34 was obtained. With four degrees of freedom this gives a P lying between .05 and .02. This also indicates the superiority of the Top Group over the Bottom Group in intelligence as measured by this test.

CHAPTER V

CONCLUSIONS

1. In the class of 215 students enrolled in the Junior Elementary and Intermediate Program, University of Alberta, 1948-49, there were significantly more girls than boys in the top group in practice teaching.

2. In this group the better student teachers had significantly higher Grade XII records than the poorer student teachers.

3. The better students in practice teaching were also significantly better in other university work.

4. The students in the Top Group had better vocabularies as shown by the Nelson-Denny Vocabulary Test than students in the Bottom Group. However, no significant difference was found between the reading abilities of the two groups as measured by the Nelson-Denny Paragraph test.

5. The most significant difference found between the groups was in spelling as measured by the Wellesley Spelling Test. The Top Group did much better than the Bottom Group.

6. The Top Group in practice teaching made significantly higher marks on Abstract Reasoning as measured by the Differential Aptitude Tests than the Bottom Group. The

Abstract Reasoning part of these tests showed no significant difference between the groups. The groups taking these tests were too small, however, to give accurate results.

7. The Johnson Temperament Analysis did not show a significant difference between groups on any one of the nine traits of personality it purports to measure.

8. The better student teachers had significantly higher IQ's as measured by the Vocational Guidance Centre Intelligence Indicator than the students who made poor marks in practice teaching.

9. Accurate prediction of success in teaching would probably be easier than prediction of poor teaching ability. In almost every test given the mean difference between the Top Group and the whole class was larger than the mean difference between the whole class and the Bottom Group. Therefore, on the basis of these tests, it would seem seafer to encourage promising students than to screen out those that seemed less likely to become successful teachers.

RECOMMENDATIONS

In conclusion the following summary of this study as it applies to a selection program for candidates for the teaching profession may be made:

1. Intelligence quotient and academic achieve-

ment (high school and university, if available) could be used as a basis for entry to the Faculty of Education.

2. On entrance a battery of tests could be administered to the students to further indicate their probable teaching success. On the basis of this study the following tests could be recommended:

(a) Nelson-Denny Vocabulary Test
(b) Wellesley Spelling Test

3. Personality and general adjustment of applicants is undoubtedly an important qualification of teachers. The Johnson Temperament Analysis was found to be of no value, however. Individual interviews at at entrance and continued personal guidance throughout the course might be more valuable.

SUGGESTIONS FOR FURTHER STUDY

1. If a teaching grading could be obtained from a Superintendent of Schools or some other qualified person on each of these eighty-six students it could be used in two ways. (a) A similar study in differences on the tests administered in this study could be made using actual teaching success to divide the students into groups. (b) A comparison of Practice Teaching marks and actual success or failure in the teaching field might show how accurate an indicator of future success the Practice Teaching course is.

2. The results of this study could be checked by following the same procedure in 1950 with the Second Year Bachelor of Education students who were tested at the same time as the Junior Elementary and Intermediate students included in this study. As the degree students do not take practice teaching in their first year they could not be included here.

3. Personality is, no doubt, an important factor in teaching. This study, like the others surveyed, suggests that the personality tests used are not very helpful in a selection or prediction program. Research on another type or on careful initial interviews with applicants might be more rewarding.

4. The lack of correlation between High School averages and Practice Teaching scores, particularly in the top and bottom groups, could be investigated. More individual guidance might be indicated.

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B29760